Mine remediation in New Zealand
Lessons from the (recent) past

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Tui Mine, Te Aroha

1884-1890s

1967-1973

Abandoned site

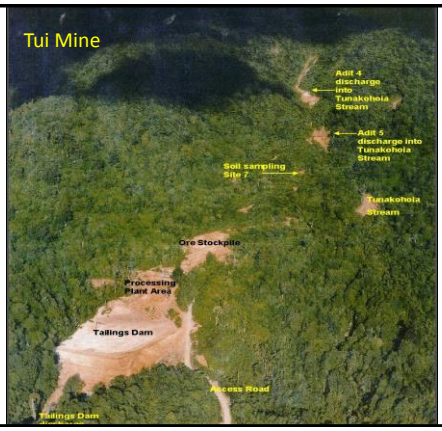
Rehabilitation 2011-2013

Golden Cross, Waitekauri

1892-1917

1992-1998

Planned rehabilitation 1998-2003



Tui mine adit drainage:

- Reporting to Tunakohoia Stream
- Copious Fe oxide
- Neutral pH
- High Zn and Cd.

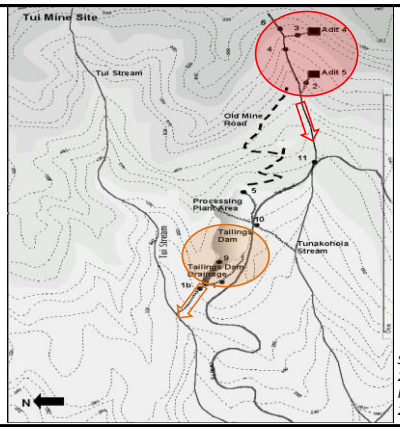
Tui mine tailing drainage:

- Reporting to Tui Stream
- Copious Fe oxide
- Low pH
- High Cu, Pb, Zn & Cd

2007:

Load kg/yr

Fe	**4850**
Mn	**652**
Cu	224
Pb	91
Zn	**2800**
Cd	13
As	2.5



2007:

Load kg/yr

Fe	91
Mn	**527**
Cu	78
Pb	34
Zn	**7300**
Cd	**43**
As	0.5

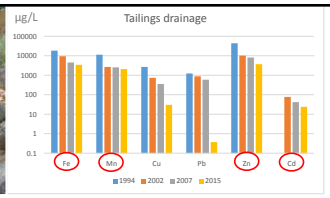
Sarah Harvey 2003
Rem Sharplin 2008

Remediation

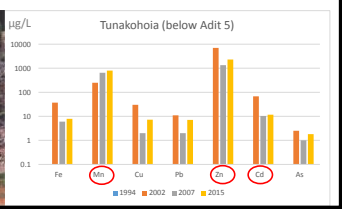
2011-2013

Phase 1: lime & plug adits ($6.5m)

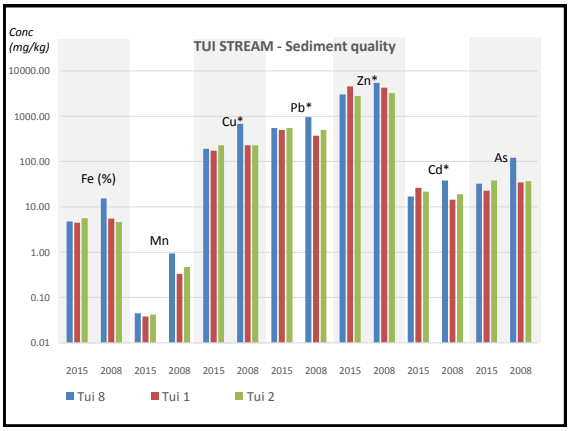
Phase 2: Stabilise and revegetate tailings dam ($15.2m)

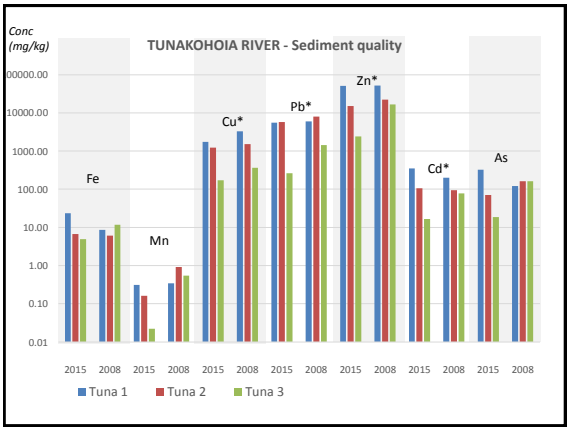


Changes in mine drainage geochemistry ?

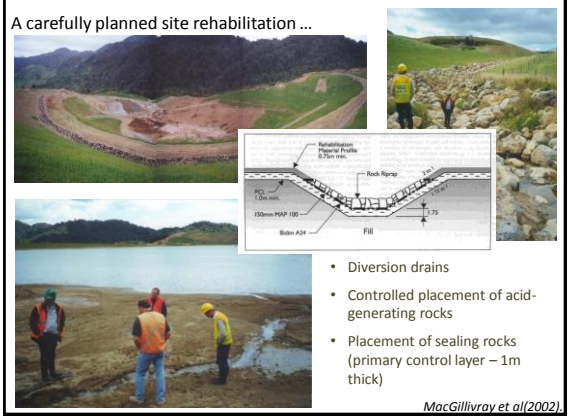


Recent (2014/15) sediment sampling of Tui and Tunakohoia catchments



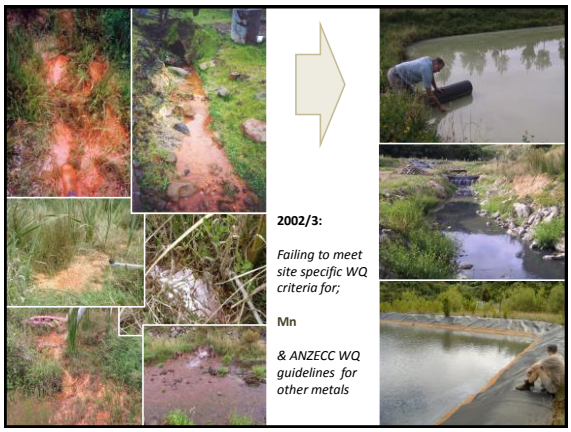


A carefully planned site rehabilitation …



- Diversion drains
- Controlled placement of acid-generating rocks
- Placement of sealing rocks (primary control layer – 1m thick)

MacGillivray et al(2002).

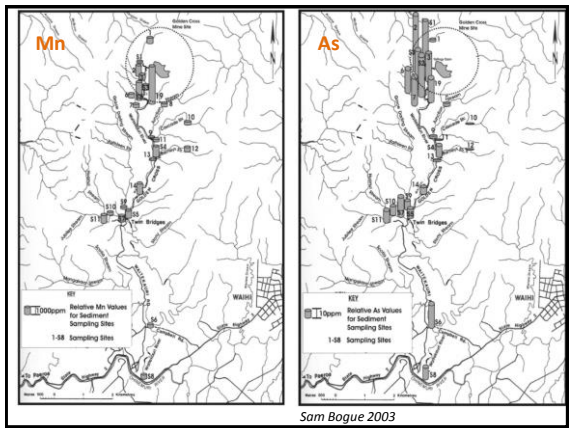


2002/3:

Failing to meet site specific WQ criteria for;

Mn

& ANZECC WQ guidelines for other metals



Sam Bogue 2003

So … WTP still operational, 12 yrs after mine closure!

Treating neutral pH mine drainage with high:

- Mn (16,000-20,000 µg/L)
- Zn (58-200 µg/L), and other metals

Potential demonstrated for native wetland plants to bioaccumulate Mn, and trap Fe oxide .. But did not take up Zn

Kieran Whelan 2007

Conclusion:

- Two mines closed within 25yrs of each other, but with very different rehabilitation approaches.
- Lack of rehabilitation has led to serious, long term sediment contamination at Tui … particularly Mn, Cd and Zn
- Similar contamination of stream sediment would result from Golden Cross (Mn, Zn, As) but for ongoing WTP operation
- Need to identify these potential geochemical legacy issues before mining, and design an ***effective*** rehabilitation plan (or not mine).

CMER Mine Environment Life Cycle Guide

Acknowledgements

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